REMARKS

Claims 1-18 are currently pending, with claims 1 and 9 being in independent form. Claims 1-16 have been amended. Support for the amendments to claims 1 and 9 may be found, for example, at pg. 6 and 13 of the specification as originally filed. The amendments to claims 2, 4-6, 8 and 10-16 clarify the wording of the claims, and are cosmetic in nature. No new matter has been added by way of this amendment. Reconsideration of the application, as amended, is respectfully requested.

The Oath/Declaration has been objected to by the Examiner for failure to include the inventor's signature". Regarding this objection, an executed declaration that included the inventor's signature was submitted on May 24, 2004, prior to receipt of a Notice to File Missing Parts (Form PCT/DO/EO/905). The enclosed copy of the stamped return receipt postcard indicates that a complete Oath/Declaration was received by the Patent Office on May 25, 2004. In any event, Applicants are re-submitting herewith a copy of the Oath/Declaration which includes the inventor's signature. Withdrawal of the objection is in therefore in order.

Claim 7 stands rejected under 35 U.S.C. §112, ¶2, as indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. In response to these rejections, Applicants have amended claim 7 in a manner that is believed to address each specific rejection. Reconsideration and withdrawal of the rejection are therefore respectfully requested.

Claims 1, 5, 6, 8, 9, 13, 14 and 16 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,864,632 ("*Ogawa*"). Claims 2-4, 7, 10-12, 15, 17 and 18 stand rejected under 35 U.S.C. §103(a) as unpatentable over *Ogawa* in view of by U.S. Patent No.

5,550,937 ("*Bell*"). For the following reasons, reconsideration and withdrawal of the rejections are respectfully requested.

Independent method claim 1 has been amended to recite the steps of "obtaining positions of the at least three control points in the image, and comparing control point structures in the image to be rectified to control point structures in the reference image, each of the control point structures comprising a plurality of pixels; calculating a resolution of the image and the reference image for an image area to determine which image area is less-resolved and which image area is more highly resolved, said image area of the image to be rectified comprising a control point structure and said image area of the reference image comprising a control point structure corresponding to the control point structure in the image to be rectified; projecting the less-resolved image area onto the more highly resolved image area corresponding to a mapping function; determining gray-scale values of respective pixels in the control point structure of the image and in a corresponding control point structure of the reference image; forming differences of gray-scale values between adjacent pixels in each of the corresponding control point structures; comparing differences in the corresponding control point structures for corresponding pixels to derive an error value; shifting one of the control point structure in the image and the reference image in at least one of a vertical and horizontal direction such that a new position of the control point structure is obtained, said error value being determined in a manner identical to the manner in which the new position of the control point structure is obtained". Independent device claim 9 has been also correspondingly amended. Support for these amendments may be found, for example, at pg. 6 and 13 of the specification as originally filed.

Independent method claim 1, as now amended, is directed to performing a fine correction of the positional error of a mapping function. Control point structures, each having a plurality of

pixels in the image to be rectified and in the reference image, are used, i.e., the corresponding control point structures in the image and in the reference image are used to determine which control point structure is more highly resolved. The less-resolved control point structure is then projected onto the more highly resolved structure. However, it should be noted that the more highly resolved control point structure is not projected onto the less resolved control point structure.

For the projected, less-resolved control point structure and for the more highly resolved control point structure, differences of the gray-scale values of adjacent pixels are calculated and the differences are compared for the two corresponding control point structures. An error value is then determined. By shifting the control point structure in the image or in the reference image and by repeated calculation of the error, a fine position correction can be performed.

Such a fine position correction can be used in accordance with the claimed invention to correct for positional errors in the sub-pixel dimension. As stated previously, the projection is performed from the less-resolved image onto the more highly resolved image. In cases where the projection occurs from the more highly resolved image onto the less-resolved image, information will be lost. Here, information from different pixels would be used to form new pixels. Such a "fusion" of pixels would always cause a loss of information. A projection, however, onto the more highly resolved image does not cause a loss of information, since the control point structure is already in a state of low resolution.

Ogawa relates to "a map editing device for assisting updating of a three-dimensional digital map of an area by utilizing an image obtained by imaging the area" (see col. 2, lines 9-11). According to *Ogawa*, "the map editing device ... detects the change of the object inclusive of the virtual change, and updates the map to a three-dimensional digital map". *Ogawa* (col. 2,

lines 36-40) teaches that the image is taken from one map view point. As a result, there is a portion of the view that is not shown in the image due to a "dead angle". A case thus arises in which the information necessary for updating the image is partially insufficient. *Ogawa* (col. 2, lines 40-45) teaches that a user therefore manually moves the map view point such that the perspective projection map viewed from the moved map view point is generated from an updated three-dimensional map and displayed. As a result, the map view point at which the insufficient information is obtained can be determined.

Ogawa, however, fails to teach the method recited in amended independent claim 1. That is, there is nothing in *Ogawa* with respect to comparing control point structures such that cumulative error in positional differences between control points and corresponding points in a reference image is minimized. Moreover, independent claim 1 recites, *inter alia*, the step of "calculating a resolution of the image and the reference image for an image area to determine which image area is less-resolved and which image area is more highly resolved, said image area of the image to be rectified comprising a control point structure and said image area of the reference image comprising a control point structure corresponding to the control point structure in the image to be rectified". *Ogawa* is silent with respect to at least these steps. In fact, there is nothing in any section of *Ogawa* cited by the Examiner with respect to the calculating step recited in amended independent claim 1. Therefore, independent claim 1 is patentable over *Ogawa*, reconsideration and withdrawal of the rejection under 35 U.S.C. §102 are in order, and notice to that effect is earnestly solicited.

Bell relates to "a mechanism for effectively mutually registering a plurality of digital images of an object, such as terrestrial images that have been obtained by a plurality of spaceborne or airborne sensors, object observation and image collection parameters of which can

be expected to be different from one another" (see col. 1, lines 27-32). *Bell* in combination with *Ogawa* fails to achieve the method of independent claim 1, since there is also nothing in *Bell* with respect to "calculating a resolution of the image and the reference image for an image area".

Moreover, amended independent claim 1 includes the additional steps of "determining gray-scale values of respective pixels in the control point structure of the image and in a corresponding control point structure of the reference image; forming differences of gray-scale values between adjacent pixels in each of the corresponding control point structures; comparing differences in the corresponding control point structures for corresponding pixels to derive an error value". Each of these features correspond to features previously defined in dependent claim 3, each of which have been incorporated into independent claim 1. *Bell* was cited to provide these features, which the Examiner has conceded are not taught nor suggested in *Ogawa*.

Bell (col. 8, lines 22-26) teaches "first neighborhoods 51-1 and 52-1 of the respective sixteen neighborhoods resampled from base images 21B and 22B that have been translated as translated neighborhoods 51-1T and 52-1T, respectively, onto co-registration surface 31 for correlation processing". *Bell* (col. 8, lines 27-31) teaches that each translated neighborhood is initially subjected to an edge content preemphasis operation in order to enhance features of each image that will consistently represent common attributes of the image regardless of the brightness or contrast in the images. *Bell* (col. 8, lines 32-35) states that "[i]t should be noted that the preemphasis operation serves to emphasize, rather than detect, edge information within the neighborhoods; it is not a feature extraction operation". However, amended independent claim 1 recites that gray-scale values of pixels are determined. There is nothing in *Bell* with respect to determining such features of pixels, i.e., a gray-scale value of respective pixels. In

fact, *Bell* specifically states that feature extraction is not performed. *Bell* therefore teaches away from determining gray scale values of pixels.

Furthermore, *Bell* (col. 8, lines 37-40; FIG. 8) describes that un-sharp masking (conventional filtering) techniques commonly employed for high spatial frequency enhancement may be employed. *Bell* (col. 8, lines 40-42) states "[b]ecause of the reduced quantity of information available for processing, it is essential that pixel-to-pixel edge transitions be enhanced". However, amended independent claim 9 recites the step of "determining gray-scale values of respective pixels. *Bell* merely discloses the enhancement of pixel-to-pixel edge transitions. There is no teaching in *Bell* that any gray-scale value are determined, or even how gray-scale values could be specifically calculated. Consequently, absent an impermissible hindsight analysis based on Applicants' disclosure, there would be nothing to provide the skilled person with the motivation to determine gray scale values in the manner disclosed by Applicants and recited in amended independent claim 1. The combination of *Ogawa* and *Bell*, therefore, fails to achieve a device that implements the steps recited in amended independent claim 1 that, *inter alia*, recites the steps of "determining gray-scale values ... forming differences of gray-scale values between adjacent pixels in each of the corresponding control point structures". In view of the foregoing, reconsideration and withdrawal of the rejection under 35 U.S.C. §103 are in order, and notice to that effect is earnestly solicited.

Amended independent claim 9 is a device associated with the method of independent claim 1. Accordingly, amended independent claim 9 is patentable over the cited references for the reasons discussed above with respect to independent claim 1.

In view of the patentability of independent claims 1 and 9 for the reasons set forth above, dependent claims 2-8 and 10-20 are all patentable over the prior art.

Based on the foregoing amendments and remarks, this application is in condition for allowance. Early passage of this case to issue is respectfully requested.

It is believed that no fees or charges are required at this time in connection with the present application. However, if any fees or charges are required at this time, they may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,
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